

ALABAMA SHORELINE CHANGE RATES:
1970-1993

Tina A. Sanchez & Scott L. Douglass
College of Engineering Report No. 94-1

Department of Civil Engineering
University of South Alabama
Mobile, Alabama 36688

prepared for
Coastal Programs Office
Alabama Department of Economic and Community Affairs
401 Adams Avenue
Montgomery, Alabama 36103-5690

July, 1994

US Department of Commerce
NOAA Coastal Services Center Library
2234 South Hobson Avenue
Charleston, SC 29405-2413

PREFACE

This report was prepared under contract (PED-USA-CZM-93-03) with the Alabama Department of Economic and Community Affairs (ADECA) with funding from the Coastal Zone Management Program (Section 306 of the Coastal Zone Management Act of 1972, as amended) administered by the National Oceanic and Atmospheric Administration. The Chief of the Coastal Programs Office of ADECA was Mr. Gilford C. Gilder. Mr. Phillip Hinesley, Planner, ADECA, was the technical monitor for the contract. This report presents the technical results of the study. Other portions of the study included a limited economic analysis of the value of the beaches and a proposed framework for a comprehensive shoreline management plan.

The report was written by Ms. Tina Sanchez, Student Assistant and Dr. Scott L. Douglass, Assistant Professor of Civil Engineering at the University of South Alabama.

The report documents a shoreline change analysis of the Gulf coast beaches of Alabama. Some air photos were purchased from the archives of the US Army Engineer District, Mobile with coordination through Mr. Michael Peterson. Some local survey elevation information was provided by David Volkert and Assoc.

TABLE OF CONTENTS

PREFACE

TABLE OF CONTENTS

INTRODUCTION.....1
METHODS.....2
RESULTS.....5
DISCUSSION.....7
SUMMARY.....16

APPENDIX A: SHORELINE CHANGE GRAPHS

APPENDIX B: BEACH PROFILES

APPENDIX C: BEACH PROFILE LOCATIONS

INTRODUCTION

One of Alabama's valuable natural resources is the sand that covers the Gulf Coast shoreline. Since most of the beach sands are owned by the citizens of Alabama, it is fitting that the current status of this valuable resource be monitored. This report outlines the erosion rates found as part of a study to develop a rational, comprehensive approach to shoreline management. The primary goal of this effort was to provide quantified, reproducible information indicating which areas along the coast are experiencing shoreline recession, accretion, or which appear to be relatively stable.

METHODS

The data used in this shoreline change study were air photos and beach profiles. The methods of data collection and analysis are described below.

AIR PHOTOS

Nine sets of vertical air photos were collected to study beach changes over 23 years, 1970-1993. Photos taken immediately after a hurricane were excluded from this photo set in an attempt to avoid strong bias. The dates and scales of the photo sets are given in Table 1. The five sets of air photos taken during the 1970's and 1980's were obtained from the archives of the US Army Engineer District, Mobile. The four sets in the 1990's belong to the Coastal Zone Management Program of Alabama.

Beach widths were measured at 95 locations along the coast from arbitrary fixed points (houses, roads, or trees) to the wetline with calipers and an engineers' scale. Photo scale corrections were made on a photo-by-photo basis with the 1990 flight assumed as the true scale.

The precision (read to nearest 60th of an inch) of any individual measurement was half of ± 33 ft. and ± 7 feet on the 1:24,000 and 1:4800 scale photo sets, respectively. Other sources of error are due to the interpretation of the wetline;

water level fluctuations due to tides, winds, barometric pressure, and waves; and the photogrammetric errors of tilt and lens distortion.

Because error estimates are larger in this analysis from 1970-86, shoreline trends would have to be large to be meaningful. The more precise measurements, 1990-93, allow for lesser trends to be seen. However, these trends may be less significant because of the shorter time scale.

LINEAR REGRESSION ANALYSIS OF SHORELINE CHANGES

Regression was used for two separate periods of record; 1970 to 1990 and 1990 to 1993. The slope of the regression line is a estimate of the trend in terms of the amount of beach loss or gain per year. Positive slope means shoreline accretion. Negative slope mean shoreline recession or erosion. The correlation coefficient (r) is a measure of how well the data fit the line. A correlation coefficient of $r=1$ would indicate a perfect linear relationship.

BEACH PROFILES

Beach profiles were surveyed at 22 selected locations along the Alabama coast at 6 month intervals during the year of this study. The locations of the profiles are shown in Figure 1.

BEACH PROFILE LOCATIONS

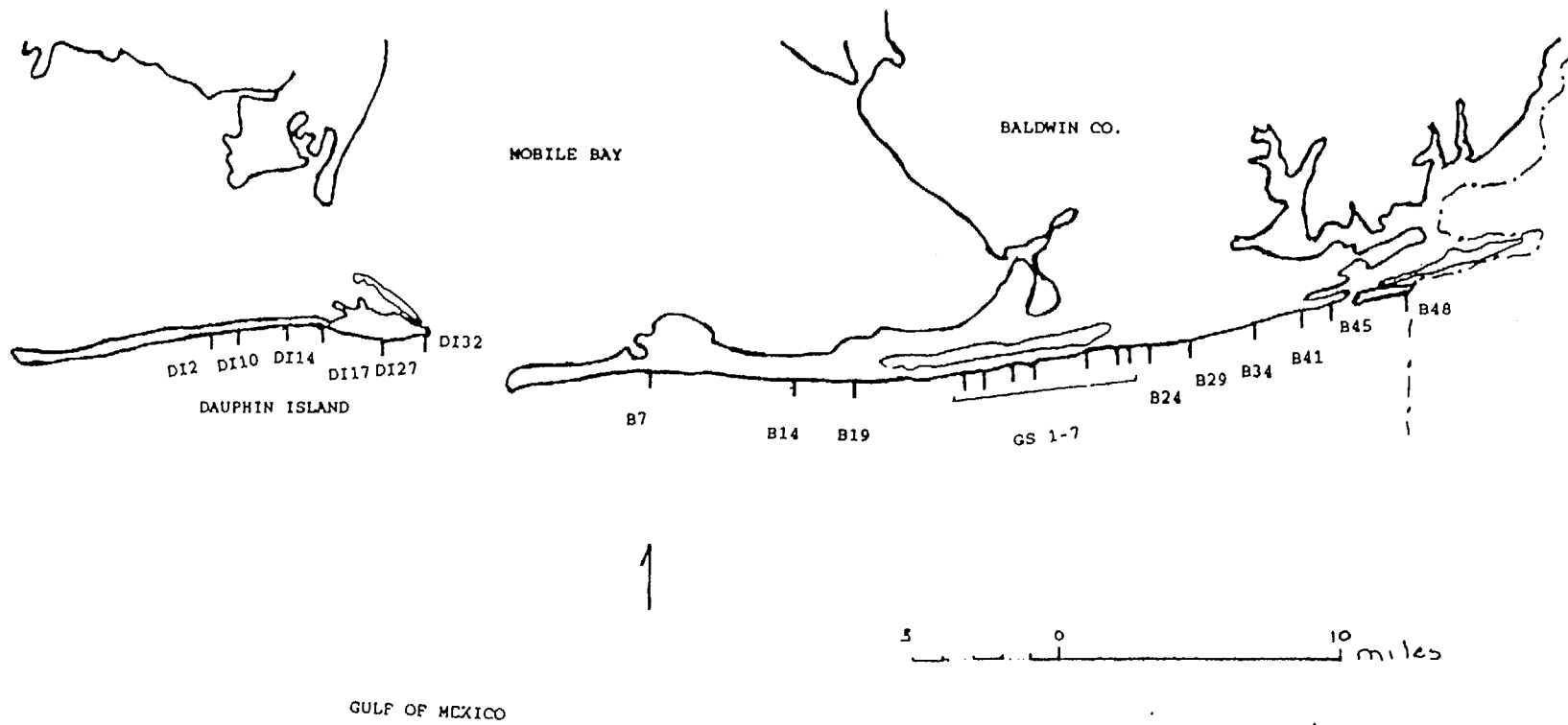


Fig. 1

Individual profiles began at Alabama Department of Environmental Management Construction Control Line monuments whenever possible. In this report, these profiles are designated by their ADEM CCL line number. Seven additional profiles were established as part of this study in Gulf Shores and are designated with "GS" numbers (Gulf Shores does not have ADEM CCL numbers). Elevations of most of the profiles were tied to the NGVD (National Geodetic Vertical Datum of 1929) through surveys. ADEM CCL monuments selected in Baldwin Co. were #48, #45, #41, #34, #29, #24, #14, #19, #7. Profiles on Dauphin Island were located at ADEM CCL monuments #32, #27, #17, #14, #10, #2.

The profiles were surveyed from the monument, usually in the sand dunes, across the beach and out to a depth of 10 feet whenever possible. Distances were measured by tape on the dry beach and a tag-line, a rope marked in fifty foot sections, in the water. A precision surveying level and rod were used to obtain the elevations. A swimmer carried the rod and tag-line through the surf.

RESULTS

The shoreline change analysis results for each of the 95 locations are summarized in Figures 2 to 4 and plotted individually in Appendix A. Figures 2 to 4 present the linear regression trend, or slope, in feet of loss or gain per year for two time periods; 1970-90 and 1990-1993. A trend is shown on Figures 2 to 7 only if the correlation coefficient (r) was greater than 0.5. Note that this is not a very restrictive condition.

Much of the state's coast did not meet this condition for the 1970-1990 time period. Accretion was experienced at several locations; east of Little Lagoon, west of Perdido Pass and at Gulf Shores. There were some pockets of erosion along Fort Morgan Peninsula. Dauphin Island from 1970-1990 experienced erosion along the East End. The areas around Sandcastle Condominiums and at the country club experienced significant accretion.

Trends from 1990-1993 differ greatly from the 20 year trends. Most locations in Baldwin County experienced beach loss. Two exceptions are west of Little Lagoon and on Morgan Point. The trends on Dauphin Island continued as they had in the 1970-1990 period. The bulge in the shoreline planform at the golf course continued to grow. Erosion continues on the east end of the island (Coast Guard and Audubon site) and around the fishing

pier.

The calculated linear regression values for each of the 95 locations (68 in Baldwin County and 27 on Dauphin Island) are summarized on Tables 2 and 3. Table 2 gives the linear regression results from 1970 to 1990. Table 3 gives the linear regression results from 1990 to 1993.

Appendix A presents more detailed shoreline change data. The graphs show the measured changes in beach width at 95 locations relative to the measured 1970 width.

The beach profile measurement results are given in graphical form in Appendix B.

DISCUSSION

The shoreline change plots indicate that there is much fluctuation in beach width both in time at a specific location and along the coast for a specific time period. However, some other general patterns are discernable. In general, the beaches were receding in the 1990's. In many locations, the 1993 beach was narrower than at any recorded value in the analysis period, 1970-1993. The shoreline changes are largest near the three inlets, Perdido Pass, Little Lagoon Pass and Mobile Pass. Since the largest shoreline fluctuations are usually found near inlets along any coastline, the Alabama coast is typical in this regard.

In spite of all the seemingly natural, temporal fluctuations, some of the greatest changes along the Alabama coast are directly and indirectly due to human construction activities. Channel dredging, beachfills, and the placement and removal of jetties all affect the natural movement of sand. There is both shoreline recession and accretion that is apparently being caused by man at each inlet.

The shoreline changes are discussed by reach below. Each reach contains 3 to 6 of the air photo analysis locations. This discussion relates to the plots in Appendix A:

BALDWIN COUNTY SHORELINE CHANGE

Perdido Pass Area (1-5)

The beach around Flora-Bama and the Ono Island bridge fluctuated within +/- 100 feet during the past 23 years. Both locations are near their most narrow in 1993. Changes at Florida Point and West Jetty show much greater fluctuations. The beach at Florida Point has lost almost 300 feet of sand since 1986 but was about this narrow in 1973. Much of the accretion at West Jetty is due to periodic placement of dredged sands from sand bypassing operations in Perdido Pass on and near the beach. Inspection of the actual air photos shows that some of this dredged sand was placed on the beach in 1991-1992 and had worked its way to the West Hilton location by 1993. The previous fluctuations along these beaches may have also been due to the dredging at the Pass. The correlation between adjacent beach widths and bypassing should be considered further.

Orange Beach Area (6-9)

The beach in this area (from west of the Hilton to just west of the Winn Dixie shopping center) is experiencing large fluctuations possibly due to being downdrift of Perdido Pass. There may be a direct correlation between beach growth and sand bypassing operations at Perdido Pass. All of the locations have been receding since 1990. Locations #7, 8, and 9 are at their

most narrow since 1970. It is possible that the sand from the 1991-1992 bypassing will move onto these beaches in the next year or so. The beach widths here in the early 1970's may have been still adjusting to the construction of the Perdido Pass jetties.

Romar Beach Area (10-13)

The beach in this area has experienced a downward trend in the nineties but were fairly stable until then.

East Gulf Shores Area (13a-16)

The beach was fairly stable from 1970 to 1990 but has experienced a significant downward trend since that time. For example, there was a 100 foot beach loss at the Pavilion between 1990 and 1993.

Central Gulf Shores (17-21)

The beach here continues the pattern found at East Gulf Shores, relative stability until the narrowing trend in the 1990's. A downward trend began between 1986 and 1990 at the Hangout and at Southern Shores. It continues there as well as at the other locations between 1990 and 1993. The beach at the Holiday Inn has experienced large fluctuations gaining and losing 150 feet of sand since 1970.

Gulf Shores West (22-25)

The beach in this area stayed within +/- 75 feet of the 1970

position until 1990 when it developed a more pronounced downward trend. Lani Kai and Pier 33 experienced losses of 100 and 70 feet respectively.

West of Pier 33 (26-29)

The beach in this area has been relatively stable. Along the western side of this reach, the beaches appear to have widened in the 1980's and then lost most of that width since 1990. This accretion and recession correlates with the construction and shortening of the pass jetties to the west.

East Little Lagoon (30-32)

The beaches immediately to the east of Little Lagoon pass fluctuated in width prior to construction of the jetties. This is probably due to the ephemeral nature of the pass at that time. After construction of the jetties (1981) the beaches widened first closest to the jetties and then spreading eastward. This pattern seems consistent with accretion updrift of a constructed jetty. Since the jetties were shortened, the beach width decreased over 150 ft. immediately to the east and lesser amounts, about 75 ft. to the east. This pattern seems consistent with what could be expected due to the shortening of the structure. Thus, the beach width and stability along this coast has been impacted by the nearby jetties.

West Little Lagoon Pass (33-36)

These beaches experienced erosion during 1980's. The pattern of erosion is consistent with erosion downdrift of shore perpendicular structures. This erosion was apparently due to the Little Lagoon Pass jetties. Two beachfills and the release of sand from the east when the jetties were shortened in the 1990's have widened the beach. However, except near the jetties, the beach width is still about 100 ft narrower than it was in the 1970's.

West Beach (37-44)

These beaches were getting narrower in the latter 80's and 90's. The easternmost location (#37) shows some recovery that is probably due to longshore sand transport from the beachfill area to the immediate east.

Pine Beach Area (45-48)

The Pine Beach area location has experienced much shoreline position variability. One possible explanation for this behavior is that shoreline orientation changes here. It is the most southerly point (excluding Morgan Point) on the Baldwin County coast. Thus it might be expected that the shoreline variability would be greatest where the shoreline is most exposed. It has also been postulated that the beach ridges in this area may be the result of long-term accretion due to cross-shore migration of sand from the shelf.

Edith Hammac (49-52)

The beach in this area experienced fluctuations throughout the study period but was within +/-60 feet of the 1970 width at all measurement locations in 1993.

Governor's House Area (53-57)

The beach was stable until accretion at all locations in 1986. This was followed by recession and continued fluctuations throughout the area.

St. Andrew's Bay Area (58-61)

The beach was stable or accreting until 1991 when all locations experienced significant losses. There has been some recovery since then but all locations continue to be more narrow than in 1970. In three years, W. Navy Cove lost the 100 feet gained during the twenty year accretionary-stable phase.

Fort Morgan Park Area (62-65)

The beaches at the Condos and east end of Fort Morgan State Park were accreting or stable until 1986. Since 1986 over 100 feet of beach has been lost at the Condos and at the access street. Conditions west of the beach access street were eroding or fluctuating. This spot has lost more than 300 feet of beach since 1970.

Morgan Point

There have been very large shoreline position changes around Morgan Point. This is consistent with the well-documented concept that shoreline position fluctuation is greatest near tidal inlets. These beaches are within the Mobile Pass ebb tidal shoal system.

DAUPHIN ISLAND BEACHES

East End (1-3)

A major erosional zone begins south of the Sea Lab tennis court. Continuous beach losses have been occurring in this area since the 1980's.

Coast Guard Base Area (4-8)

This area has experienced more erosion than any other on Dauphin Island. After some fluctuations in the 1970's the beach here has lost a minimum of 250 feet and in some locations as much as 550 feet.

Audubon Place Area (9-12)

The beach at Audubon Place has been fairly stable since 1983. Thus, this area is the current western edge of the erosional area at the Coast Guard site. This is also the current edge of an accretional area to the west. From 3 blocks west of Audubon Place

to Sandcastle Condominiums the beach is generally accreting as it fluctuates.

Golf Course Area (13-17)

At 2 blocks west of Sandcastle and at Hole 3 erosional zones are flanking a significant zone of accretion. A 400 foot bulge in the shoreline planform has formed south of the golf course at Holes 1 and 2. Just west at the country club tennis court the beach has been fluctuating at +/- 100 feet from 1970 to 1990 and now appears to be relatively stable at its 1970 width.

Park and Beach Board Pier and Beach Area (18-20)

The beach in this area has experienced erosion since 1976. The beach at the pier and west of the pier has lost more than 250 feet of width.

West of Holiday Inn (21-23)

At #21, one block west of Holiday Inn the beach gained sand from 1973 to 1983. Since then it has lost almost 150 feet of width. The beaches to the west have experienced fluctuations and were also at their narrowest in the 1990's.

West End (24-27)

These locations show that the beach from west of Holiday Inn to the end of the paved road has fluctuated during the past 23 years but generally shows losses between 0 and -100. Locations #'s 24-27

continued to lose beach between 1990-93.

BEACH PROFILES

The beach profiles show that there was much sand stored in the primary sand bar system during the 1992-1993 time period. During the year, this sand volume moved seaward and landward but in most cases, did not attach to the shore.

Since the air photo analysis showed many locations lost dry beach width in the 1990s, one logical question is, did sand move off the dry beach into the bar system? The profiles for the last of the three years do not indicate the formation of a new bar system with material from the dry beach. Unfortunately, profile surveys that cover the bar prior to 1992 are not available to further address the question.

SUMMARY

The Alabama coast experiences shoreline fluctuations at different times in different locations. The beach changes show several general patterns. One, many of the beaches did not have a significant trend in any direction in the 1970s and 1980s. They just fluctuated back and forth. Two, many of the beaches were eroding during the 1990s. At many locations, the beaches are narrower in 1992-1993 than at any other time in the period of analysis (1970-1993). Three, the shoreline fluctuations are largest near the inlets. Four, some of this fluctuation at the inlets is due to man's intervention including jetties, beachfills, and dredging. The information gained about the sand resource, particularly the losses in beach width in the 1990s, suggests that further monitoring at this level is appropriate.

APPENDIX C - BEACH PROFILE LOCATIONS

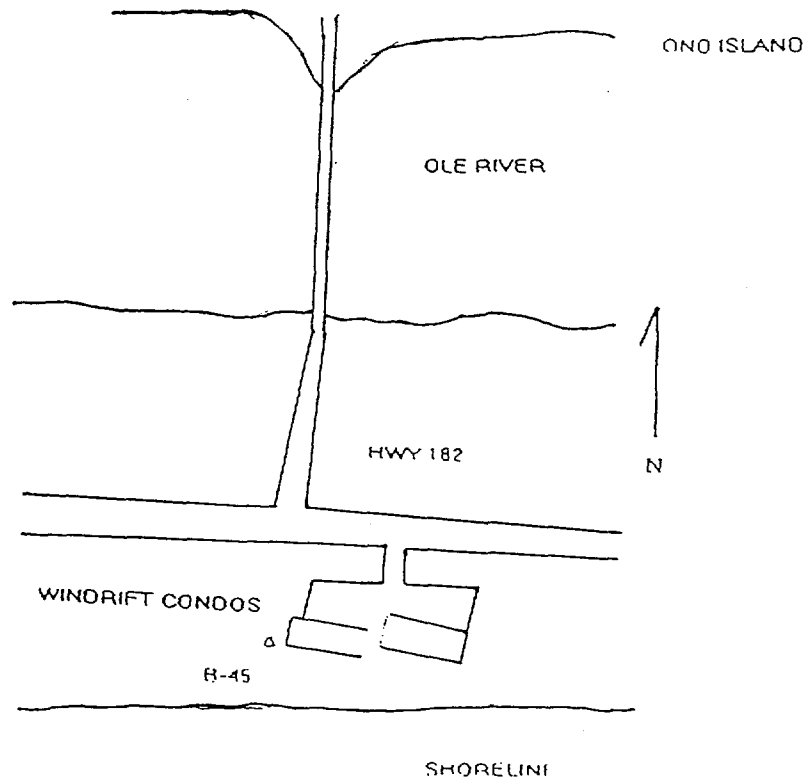
PROFILE NAME: Windrift Condos, Perdido Key

ADEM CONSTRUCTION CONTROL LINE #: 45

STATE PLANE COORDINATES: X= 488,825.140 ft.
Y= 100,844.567 ft.

ELEVATION: 10 NGVD

DESCRIPTION: The station is located on Perdido Key in a low pass through the sand dunes near the west side of the Wind Drift Condominium. From the southwest corner of the west building-N 70 degrees W-73ft. From the northwest corner of the west building-S 55 degrees W-76ft. The station is an aluminum disk set in the top of a six inch square concrete post, projecting ten inches, and stamped ADEM B-45 1985.



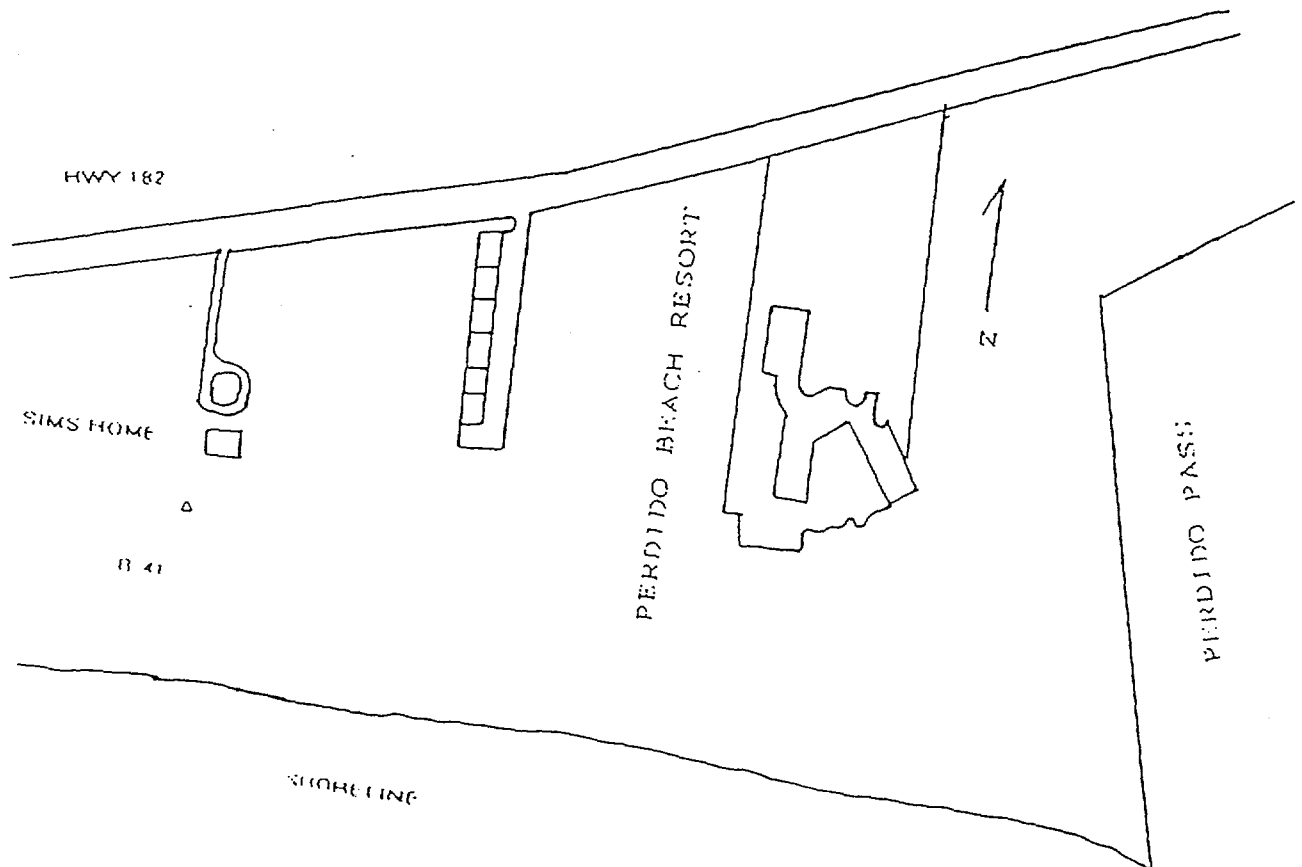
PROFILE NAME: Sims Home

ADEM CONSTRUCTION CONTROL LINE #: 41

STATE PLANE COORDINATES: X= 479,249.115 ft.
Y= 99,050.021 ft.

ELEVATION: 10 NGVD

DESCRIPTION: From the junction of Al. 59 and Al. 182 drive east on 182 for 7.9 miles to Mile Post 14.35 and turn right at Sims mailbox. The station is located on a low sand dune approximately 100 ft north of the beach. From a light pole near the beach-S 60 degreesW-57 ft. The station is an aluminum disk set in the top of a six inch square concrete post, projecting six inches, and stamped ADEM B-41 1985.



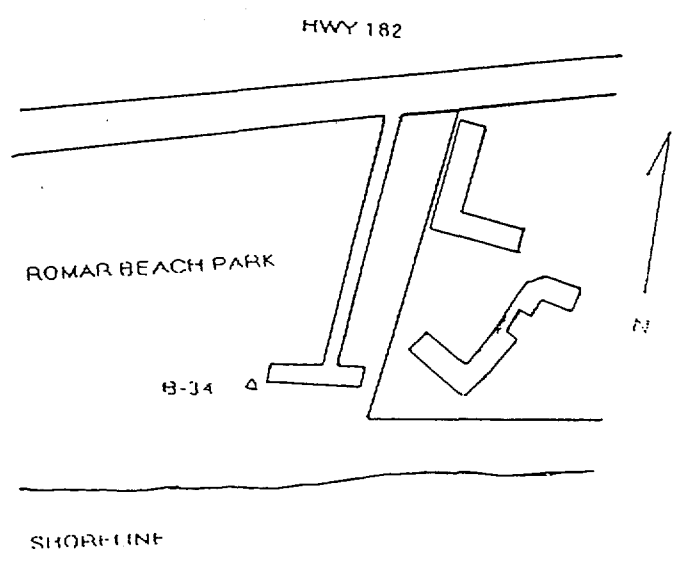
PROFILE NAME: Romar Beach Park

ADEM CONSTRUCTION CONTROL LINE #: 34

STATE PLANE COORDINATES: X= 466,038.578 ft.
Y= 95,534.410 ft

ELEVATION: 15 NGVD

DESCRIPTION: The station is located on the side of a sand dune near the southwest corner of the paved parking lot and approximately 100 ft. north of the beach. From the southwest corner of the paved parking lot-West-20.3 ft. From a four-inch square concrete post-S 85 degrees W-62.9 ft. The station is an aluminum disk set in the top of a six inch square concrete post, projecting ten inches, and stamped ADEM B-34 1985.



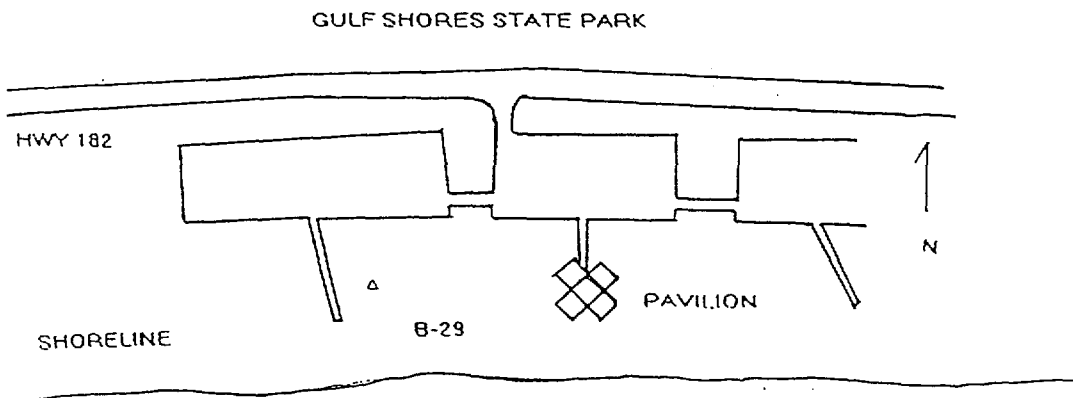
PROFILE NAME: Gulf Shores State Park Pavilion

ADEM CONSTRUCTION CONTROL LINE #: 29

STATE PLANE COORDINATES: X= 454,188.522
Y= 92,349.654

ELEVATION: 5.96 NGVD

DESCRIPTION: The station is located in the Gulf State Park approximately 250 ft. north of the beach. From the east edge of the wood walkway-N 70° E-80ft. From the southeast corner of the wood walkway-N 25 degrees E-98ft. From a light pole at the south edge of the parking lot-S 05 degrees W-149ft. The station is an aluminum disk set in the top of a sixteen-inch square concrete post, projecting eighteen inches, and stamped ADEM B-29 1985.



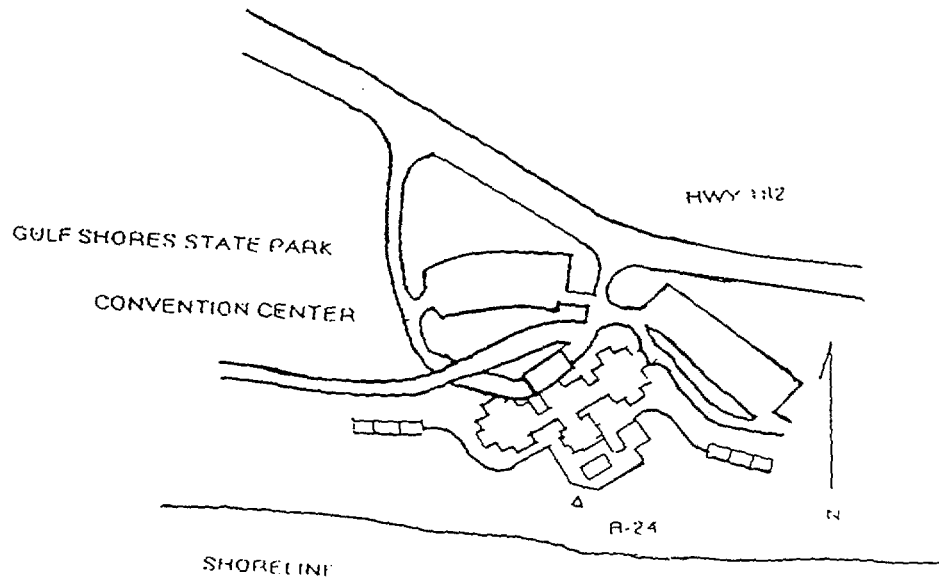
PROFILE NAME: Gulf Shores State Park Convention Center

ADEM CONSTRUCTION CONTROL LINE #: 24

STATE PLANE COORDINATES: X= 448,325.619 ft.
Y= 90,757.219 ft.

ELEVATION: 9.6 NGVD

DESCRIPTION: The station is located near the southwest corner of the Gulf State Park Convention Center outside the concrete seawall. From the curved concrete seawall-S 10 degrees E-4.9ft. From the southwest corner of a porch at the southwest corner of the Convention Center-S10 degrees E-37.8 ft. The station is an aluminum disk set in the top of a six inch square concrete post, projecting six inches, and stamped ADEM B-24 1985.

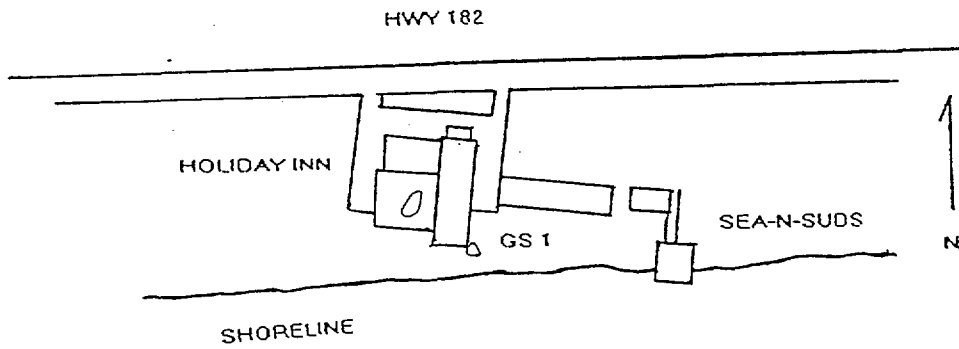


PROFILE NAME: Holiday Inn, Gulf Shores

BENCHMARK #: G.S. 1

ELEVATION: 4.24 NGVD

DESCRIPTION: Benchmark is top corner (SE) of top step at base of vertical wall at Holiday Inn.

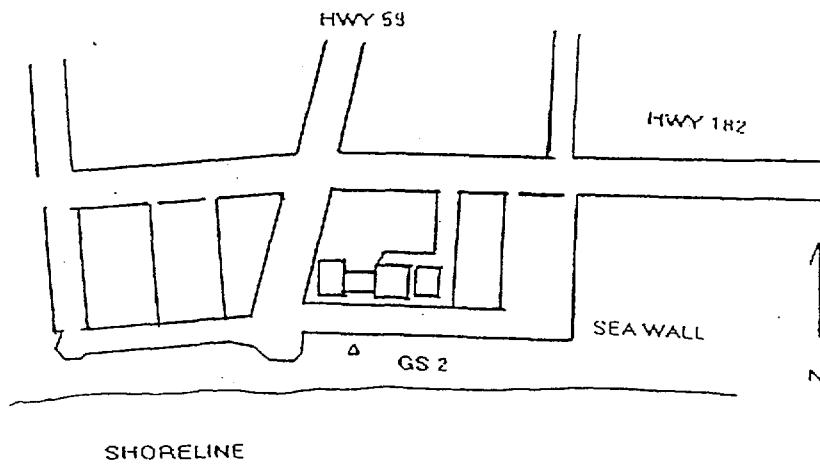


PROFILE NAME: Main Beach, Gulf Shores

BENCHMARK #: G.S. 2

ELEVATION: 10.3 NGVD

DESCRIPTION: Benchmark is top of aluminum seawall in front of second light pole (#481) east of main beach pavilion.



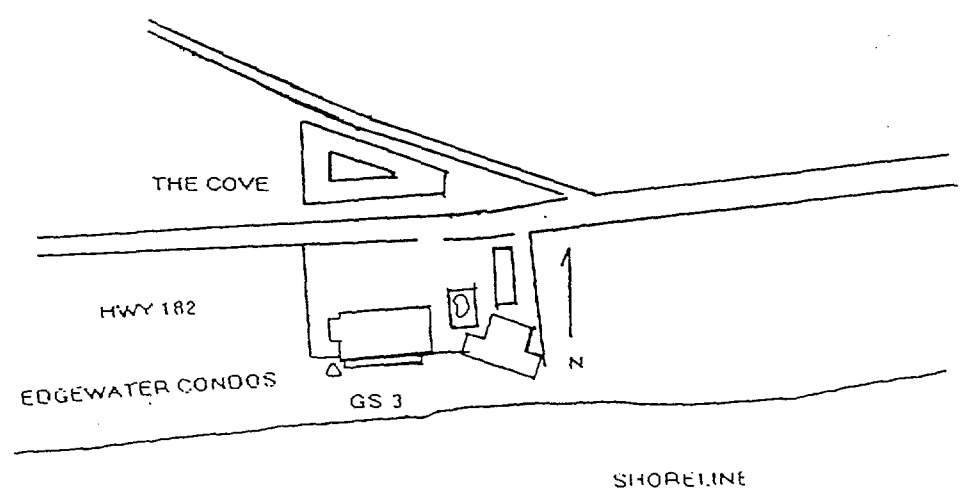
C-10

PROFILE NAME: Edgewater Condos

BENCHMARK #: G.S. 3

ELEVATION: 7 NGVD

DESCRIPTION: Benchmark is SW corner of aluminum bulkhead beneath wooden rail.

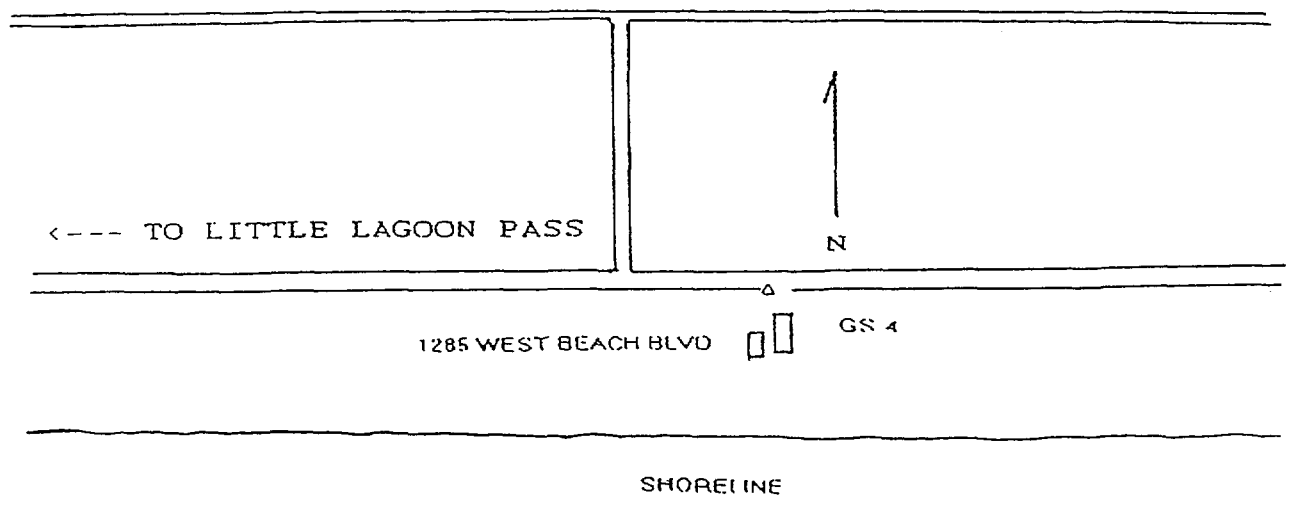


PROFILE NAME: 1285 West Beach Blvd.; East of Pass

BENCHMARK #: G.S. 4

ELEVATION: 6.7 NGVD

DESCRIPTION: Benchmark is located on edge of highway approximately 1 mile east of Little Lagoon Pass between 1285 and 1289 West Beach Blvd.

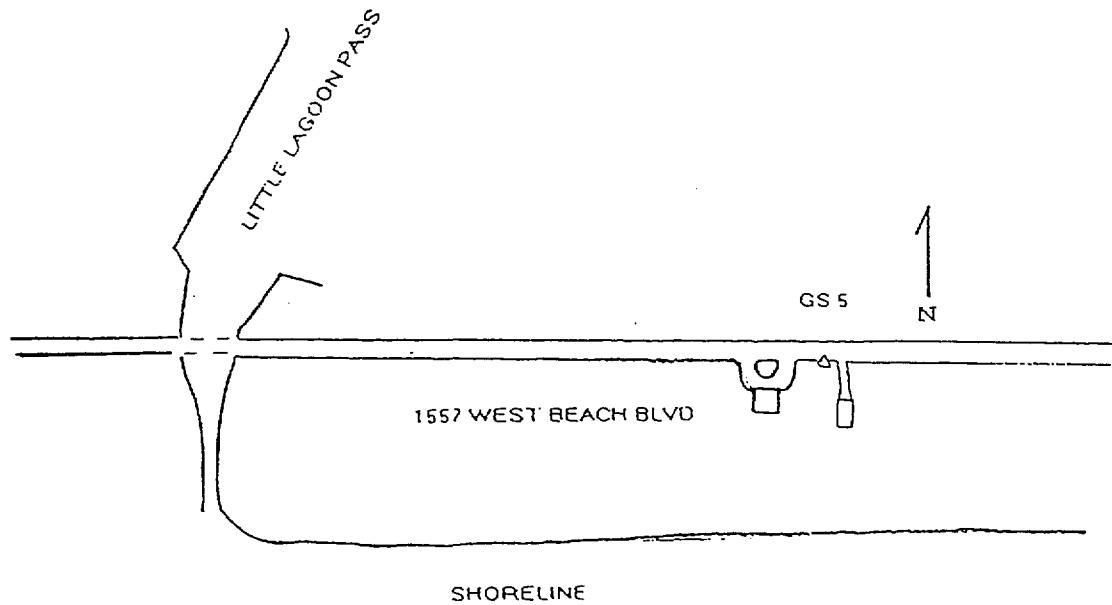


PROFILE NAME: 1557 West Beach Blvd. (East of Pass)

BENCHMARK #: G.S. 5

ELEVATION: 6.9 NGVD

DESCRIPTION: Benchmark is located on edge of highway approximately 1500 feet east of Little Lagoon Pass.

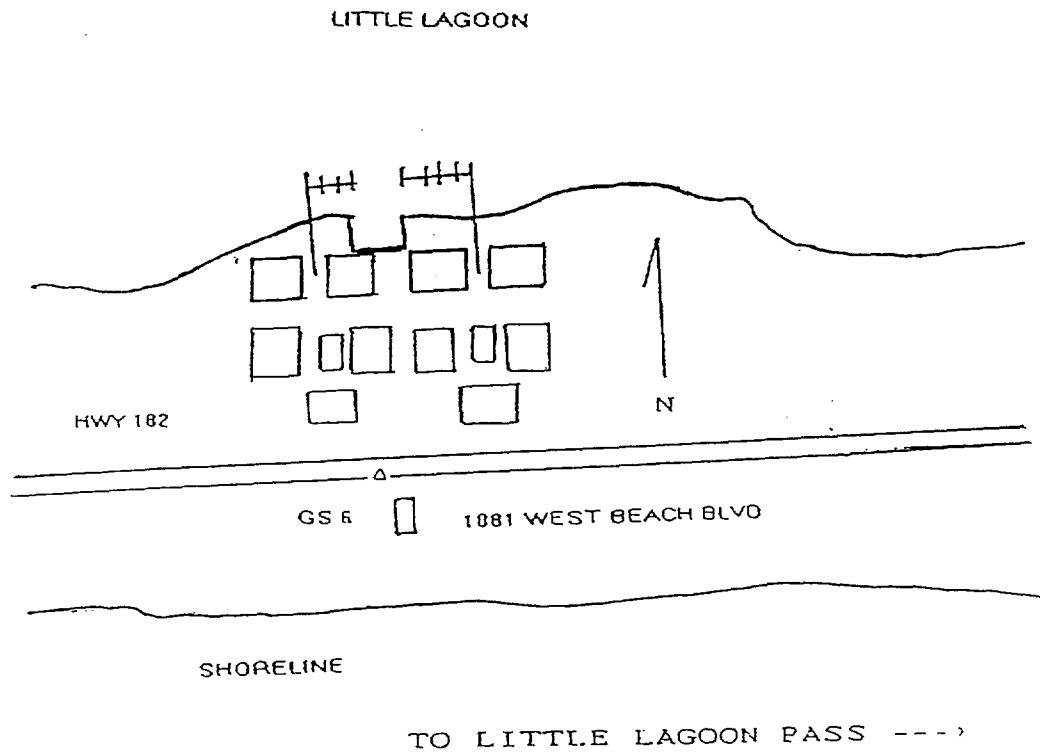


PROFILE NAME: 1881 West Beach Blvd.

BENCHMARK #: G.S. 6

ELEVATION: 9.98 NGVD

DESCRIPTION: Benchmark is located on edge of highway 2500 feet west of Little Lagoon Pass.

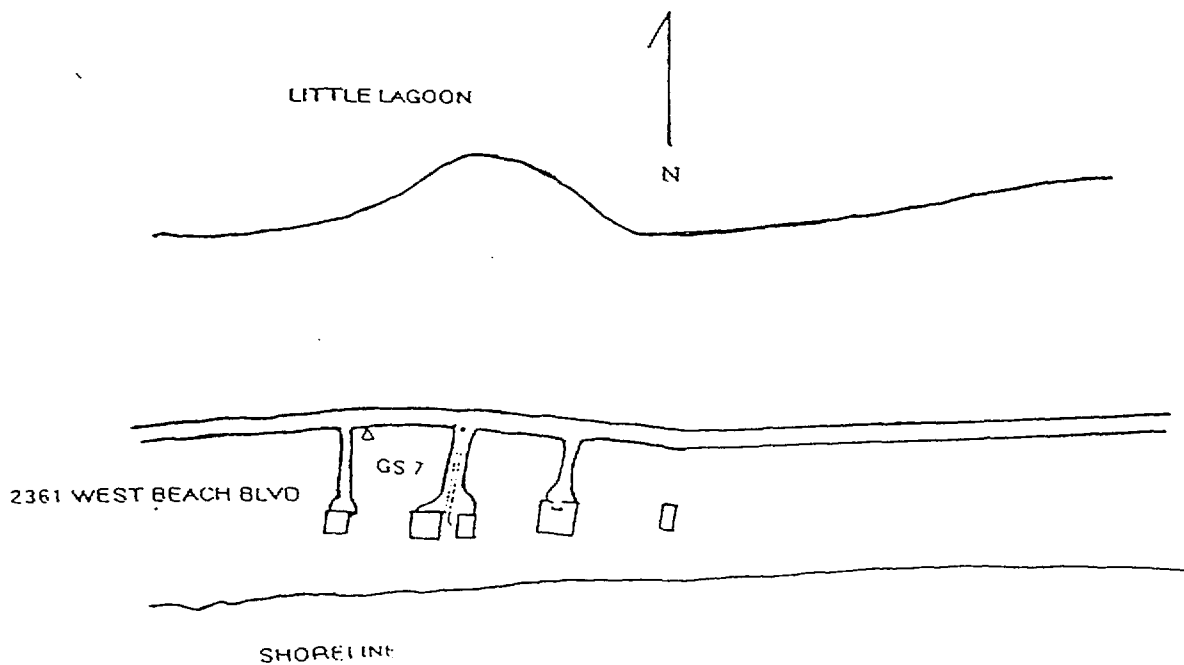


PROFILE NAME: 2361 West Beach Blvd.

BENCHMARK #: G.S. 7

ELEVATION: 6.05 NGVD

DESCRIPTION: Benchmark is located on edge of highway 8500 feet west of Little Lagoon Pass. Line is parallel to side of house to west.



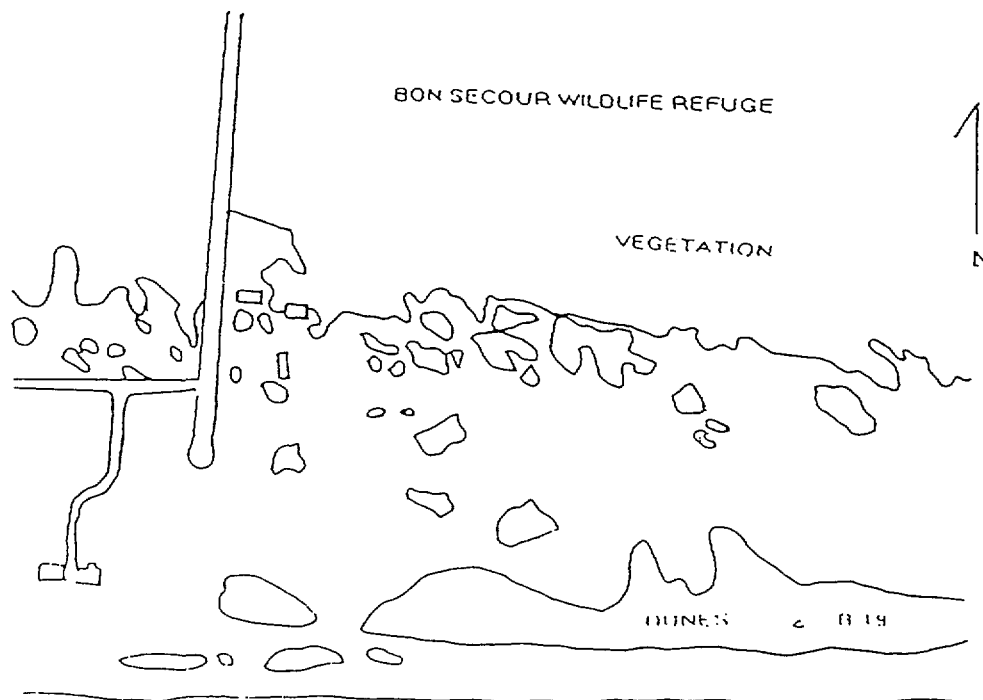
PROFILE NAME: Bon Secour Wildlife Refuge

CONSTRUCTION CONTROL LINE #: 19

STATE PLANE COORDINATES: X= 396,624.613
 Y= 83,299.904

ELEVATION: 14 NGVD

DESCRIPTION: Drive west from Al. 59 and Al. 180 for 9.05 miles to Mile Post 11.9 turn left at "Dunes Lakes East Boundary" sign drive south 1.35 miles to the end of the road, then walk for .25 mile to the station. The station is located near the southwest corner of a National Wildlife Refuge on top of a small sand dune approximately 175 feet north of the beach and approximately 550 feet east of a 100 foot radio tower. The station is an aluminum disk set in the top of a six-inch square concrete post, projecting six inches, and stamped ADEM B-19 1985.



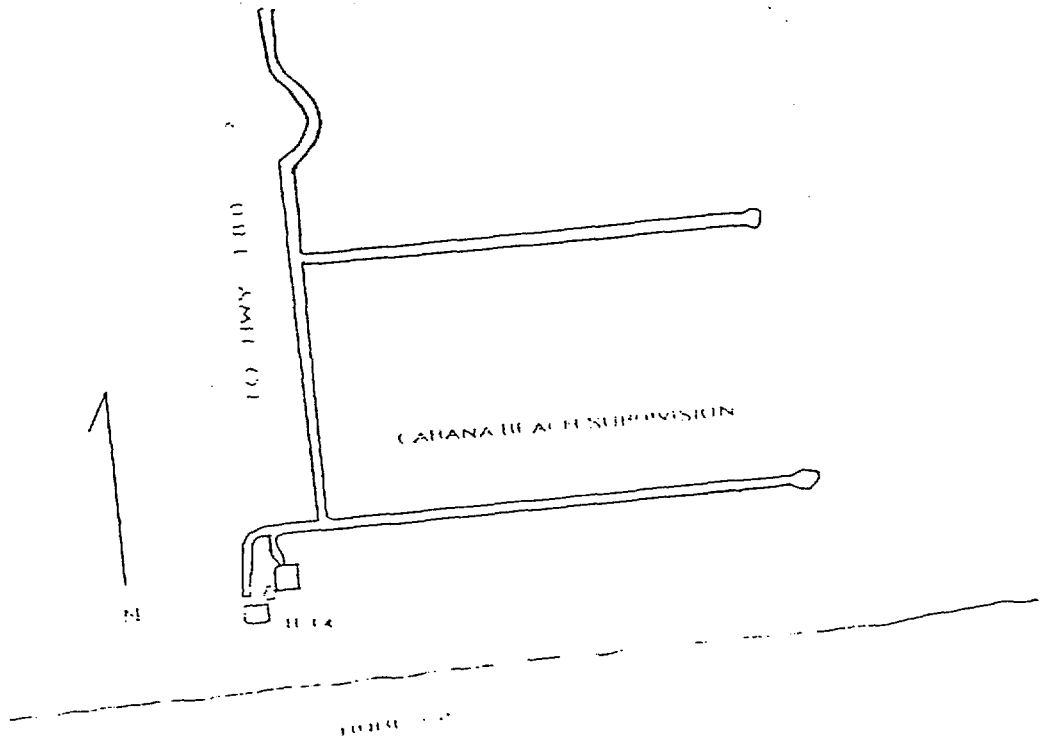
PROFILE NAME: Cabana Beach

CONSTRUCTION CONTROL LINE #: 14

STATE PLANE COORDINATES: X= 382,099.449
Y= 83,460.299

ELEVATION: 10 to 11 feet NGVD

DESCRIPTION: From Al. 59 and Al. 180 drive west 11.75 miles to Mile Post 9.2 turn left to Cabana Beach Subdivision and drive southerly for .3 mile to east-west clay road, turn right and drive west for .05 mile to the end of the road and a driveway left, turn left and drive south for .05 mile to the southwest beach house and the station on the left. The station is located near the northeast corner of the southwest beach house. The station is an aluminum disk set in the top of a six-inch square concrete post, projecting six inches, and stamped ADEM B-14 1985.



PROFILE NAME: Fort Morgan Rd., Mile Post 4.6

ADEM CONSTRUCTION CONTROL LINE #: 7

STATE PLANE COORDINATES: X= 358,262.949
Y= 84,424.908

ELEVATION: 9 TO 10 feet NGVD

DESCRIPTION: From the junction of Al. 59 and Al. 180 in Gulf Shores, Al.: drive west 16.35 miles to Mile Post 4.6 and a shell road left; turn left on the shell road and drive south for .10 mile to two beach houses and the station behind the one on the right with a wooden mask on the front.

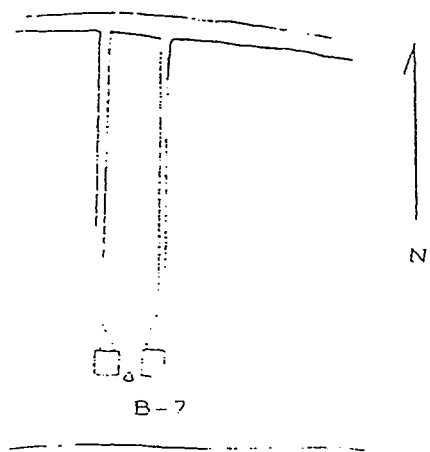
The station is located near the southwest corner of a frame beach house with a wooden mask on the front.

From the southwest corner of the porch of the house with the mask-s 10 degrees W-34ft.

From the southeast corner of the porch of the house on the west-East-61ft.

From the northeast corner of the house on the west-S-45 degrees E-84ft.

The station is an aluminum disk set in the top of a six-inch square concrete post, projecting six inches, and stamped ADEM B-7 1985.



SHORELINE

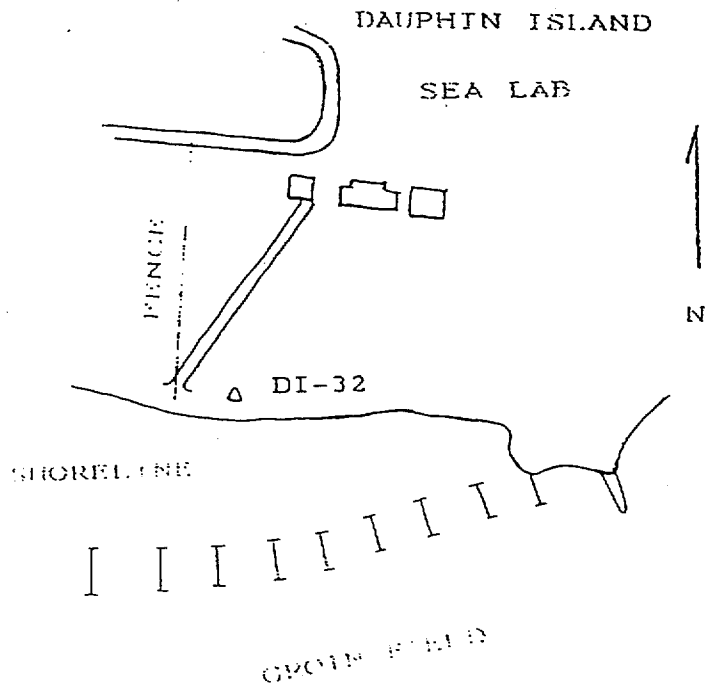
PROFILE NAME: Groin Field

ADEM CONSTRUCTION CONTROL LINE #: 32

STATE PLANE COORDINATES: x = 317,386.03
y = 89,909.02

ELEVATION: 5.4 NGVD

DESCRIPTION: The station is on Dauphin Island Sea Lab property, approximately 50 ft. N of the Gulf and 300 ft. S of Galathea Hall, Dauphin Island Sea Lab. The marker is set in a 6"x6" concrete block with an aluminum disk stamped ADEM DI 32 1986. The elevation was taken from Corps. marker 21D-aB located at State Plane Coordinates: x = 316,787.303 y = 90,061.148, EL = 6.09 NGVD.



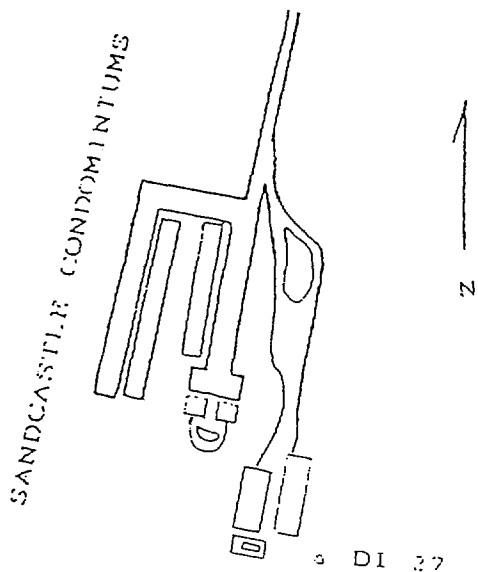
PROFILE NAME: Sand Castle Condominiums

ADEM CONSTRUCTION CONTROL LINE #: 27

STATE PLANE COORDINATES: X = 311,275.88
Y = 88,837.93

ELEVATION: 7.2 NGVD

DESCRIPTION: This station is located at Sand Castle Condominiums at the end of Forney Johnston Drive. The station is approximately 51 ft. SE of the SE corner of the eastern most seaward condominium and approximately 100 ft. E of the NE corner of the swimming pool. The marker is set in a 6"x6" concrete block with an aluminum disk stamped ADEM DI 27 1986. The elevation was taken from Corps marker 21D-1F located at State Plane Coordinates: x = 310,599.731 y = 88,946.689 EL = 7.15 NGVD.



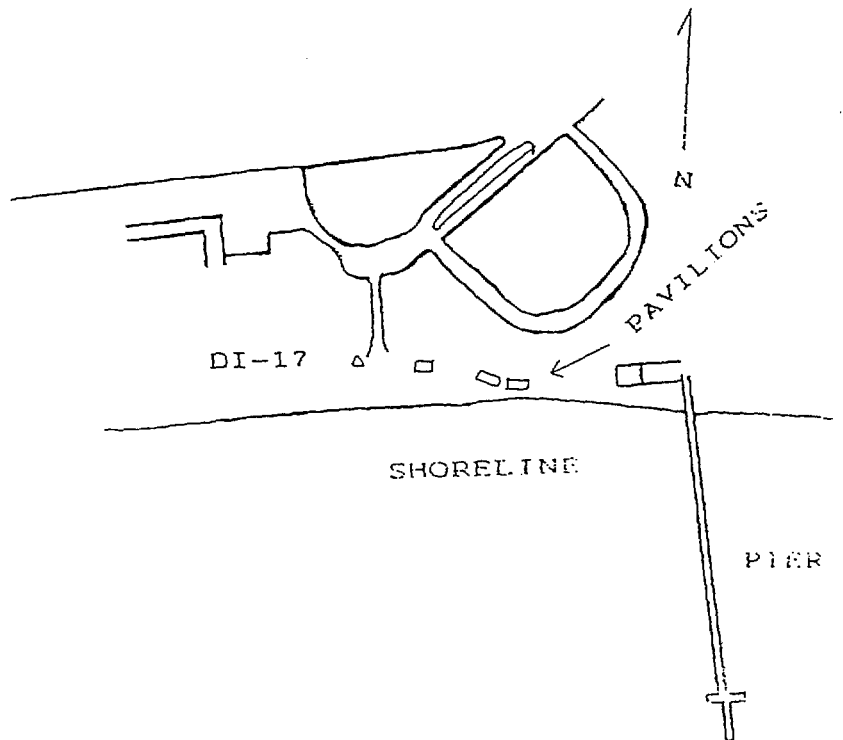
PROFILE NAME: Public Pier & Beach

ADEM CONSTRUCTION CONTROL LINE #: 17

STATE PLANE COORDINATES: X = 301,494.85
Y = 90,976.43

ELEVATION: 17.1 NGVD

DESCRIPTION: This station is located on Dauphin Island Public Beach property on a large sand dune W of eastern most pavilion. It is approximately 100 ft. N of the Gulf and 175 ft. W of western most pavilion. The marker is set in a 6"x6" concrete block with an aluminum disk stamped ADEM DI 17 1986. The elevation was taken from Corps marker 21D-1U located at State Plane Coordinates: x = 302,085.424 y = 91,443.011 EL = 17.42 NGVD.



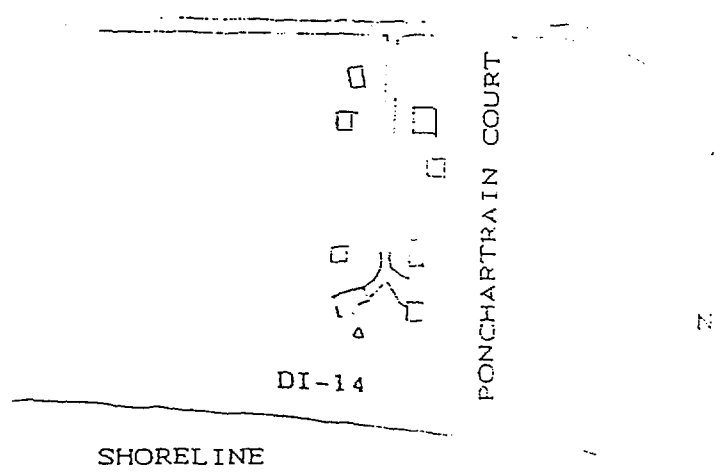
PROFILE NAME: Ponchartrain Court

ADEM CONSTRUCTION CONTROL LINE #: 14

STATE PLANE COORDINATES: X = 297,810.57
Y = 91,484.76

ELEVATION: 8.7 NGVD

DESCRIPTION: This station is located at the end of Ponchartrain Court 130 ft. SW of the end of the pavement and approximately 50 ft. SW of a palm tree in the front yard of the house named "Huracan." The marker is set in a 6"x6" concrete block with an aluminum disk stamped ADEM DI 14 1986. The elevation was taken from Corps marker 21D-1L located at State Plane Coordinates: x = 297,858.145 y = 91,712.678 EL = 6.25 NGVD.



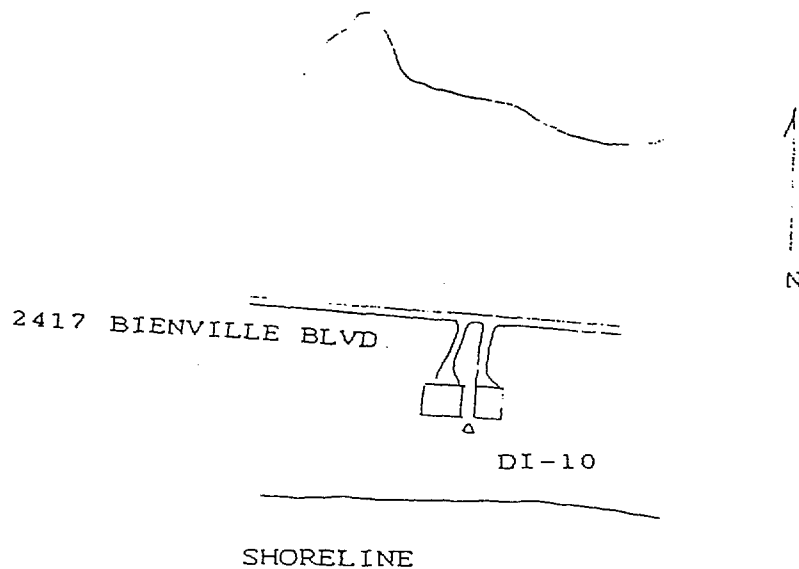
PROFILE NAME: 2417 Bienville Boulevard

ADEM CONSTRUCTION CONTROL LINE #: 10

STATE PLANE COORDINATES: X = 291,080.41
Y = 91,500.36

ELEVATION: 6.0 NGVD

DESCRIPTION: This station is located between two houses, one of the houses being 2417 Bienville Blvd. The monument is 15 ft. W of the blue house (2417 Bienville Blvd.) and 30 ft. E of the grey house. The marker is set in a 6"x6" concrete block with an aluminum disk stamped ADEM DI 10 1986. The elevation was taken from a nearby benchmark furnished by Mr. Showers, a local surveyor.



PROFILE NAME: West End

ADEM CONSTRUCTION CONTROL LINE #: 2

STATE PLANE COORDINATES: X = 281,726.92
Y = 90,678.82

ELEVATION: 7.1 NGVD

DESCRIPTION: This station is located at the western end of Bienville Blvd. approximately 140 ft. N of the Gulf, 2 ft. NW of SW most pile of the newly built house "Tales End", 100 Bienville Blvd., and approximately 100 ft. S of manhole cover on the S side of Bienville Blvd.'s end. We believe that this monument was disturbed in the Fall of 1991, and that it's location should be resurveyed. The elevation was taken from a nearby benchmark furnished by Mr. Showers, a local surveyor.

